Report

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To: James Yap - Snohomish County

From: Andrew Boone

Date: February 1, 2013

Subject: Wellington Hills Noise Study

Introduction

Snohomish County is planning to develop the currently existing Wellington Hills Golf Course located in Woodinville, WA into a community park that includes a playfield area that will accommodate soccer, football and lacrosse. This noise study was conducted to document existing noise levels at this current site and predict the acoustical impacts from this future development to neighboring adjacencies.

Site Description

The currently existing Wellington Hills Golf Course is located in the Wellington Heights neighborhood just north of Woodinville city limits in unincorporated Snohomish County. The zip code designation however still gives this site a Woodinville address. This facility is located both north and south of Wellington Heights Road (240th St SE) and just west of 71st Drive SE. This property sits on a hill a few hundred feet above Woodinville Snohomish Rd (Hwy 9) located to the west and State Route 522 to the north and west. The future development includes the entire golf course as well as the section of property west of 74th Ave SE, between NE 205th St (the division between Snohomish and King counties) and Wellington Heights Road.

Executive Summary

Based on our noise surveys and observations, noise levels from the future Wellington Hills facility are expected to be in compliance with daytime noise code requirements to adjacent properties within both King and Snohomish counties. If the same activities were to occur at night (after 10pm) however, levels would be expected to exceed noise ordinance requirements at the nearest adjacent properties to the south and east of playfield locations.

Although noise levels during the day are expected to meet code, activities are expected to increase the ambient environment above existing background levels to the nearest adjacent properties to the south and east of playfield areas. Properties north of playfields across 240th Ave NE will see much less of an impact due to increased distance as well as the prevalence of unrelated noise sources along 75th Ave SE and 240th St SE. It is anticipated that the most frequent noise neighbors may observe will be from players, coaches and spectators talking, shouting and cheering. Whistles, are anticipated to be the loudest source of noise from playfield activities, but are expected to occur less often than voice sources.

The following sections provide detailed information on the noise surveys that were conducted at the proposed site based on existing topography and at currently existing soccer fields. These

measurements and observations were used to compare noise environments and predict the acoustical impacts of the future Wellington Hills playfield areas.

Noise Ordinances

Properties to the south of the future Wellington Hills Park facility are within King County and fall under the City of Woodinville jurisdiction. The actual Wellington Hills site and other adjacencies are part of unincorporated Snohomish County, although these properties within Snohomish County carry a Woodinville address given their zip code designation. This property and Snohomish County adjacencies are zoned as R-5 Residential based on Snohomish County zoning map, while properties within Woodinville city limits are zoned as R-1 Residential. Based on this zoning, noise from this facility to neighboring adjacencies cannot exceed maximum permissible sound levels of 55 dBA during the day (from 7am to 10pm) and 45 dBA at night (10pm to 7am) according to both Snohomish County[1] and City of Woodinville[2] noise ordinances. The code also permits short term exceedances of these levels in any 1-hour period by the following; 5 dBA for not more than 15 minutes, 10 dBA for not more than 5 minutes, and 15 dBA for not more than 1.5 minutes.

Snohomish ordinance further penalizes noise that has a pure tone component[3] (referee whistles fall under this definition based on our observations) by an additional 5 dB, but only at night. The Woodinville noise ordinance references the state of Washington maximum permissible noise levels included WAC-173-60-040 which does not include a penalty for pure tones either day or night.

Based on these applicable noise ordinances, noise levels from this facility need to meet the following requirements:

- Daytime noise limits, from 7am and 10 pm, are 55 dBA with the following allowances:
  - Noise levels cannot exceed a maximum of 70 dBA anytime
  - In any given hour the following noise level increases are permitted:
    - 65-70 dBA can exist, but for no more than 1.5 min ($L_{2.5}$)
    - 60-65 dBA can exist, but for no more than 5 min ($L_{8.3}$)
    - 55-60 dBA can exist, but for no more than 15 min (L_{25})
- Nighttime noise limits, from 10 pm to 7am, are 45 dBA with the following allowances:
  - Noise levels cannot exceed a maximum of 60 dBA anytime
  - In any given hour the following noise level increases are permitted:
    - 55-60 dBA can exist, but for no more than 1.5 min ($L_{2.5}$)
    - 50-55 dBA can exist, but for no more than 5 min ($L_{8.3}$)
    - 45-50 dBA can exist, but for no more than 15 min (L_{25})

For Snohomish county receiving properties a 5 dB penalty can be assessed for noise from referee whistles at night, effectively reducing each of these nighttime limits by a additional 5 dB for tonal type noise.

Measurement Locations

For this study we conducted noise measurements at three different sites: the existing Wellington Hills Golf Course (from August 31, 2012 to September 4, 2012), Kasch Park adult soccer fields located at 8811 Airport Rd in Everett (taken in the evening on Sunday September 16, 2012), and the City Sports Fields in Woodinville at 17401 133rd Ave NE (taken in the

[1] Snohomish County Code Chapter 10.01 Noise Control
[2] Woodinville Municipal Code Chapter 8.08 Noise Regulation (Ordinance 219)
[3] See definition taken from Snohomish County Code 10.01.020-27 in Appendix B

afternoon on Saturday September 22, 2012). More detailed information about specific noise monitoring equipment used at each measurement location is included in Appendix A of this document.

At the Wellington Hills site, four meters were placed in various locations to evaluate existing ambient sound levels. An effort was made to capture a representation of the various noise conditions encountered on the site. The West monitor was placed on a hillside set back approximately 50' from Wellington Heights Rd/240th St SE to quantify sound from traffic ascending and descending the Wellington Heights plateau. The East monitor was placed approximately 25' from the existing golf course parking lot and 220' from Wellington Heights Rd to provide a representation of exiting local traffic for the site entering and exiting the existing facility as well as traffic from adjacent roadways and elsewhere. The Northeast and Southeast monitoring locations were chosen to provide a representation of ambient noise in the areas where local traffic was expected to have less of an impact. The Southeast monitor was placed approximately 50' from the 9th hole tee box to give a representation of the existing noise some of the nearby residences are experiencing from the golf course operations. These specific measurement locations are shown in Figure 1.

Figure 1: Wellington Hills GC Measurement Locations

It is anticipated that the Wellington Hills Park playfields will facilitate soccer, lacrosse, and football activities. To assist in our predictions of noise impacts from this future facility, we monitored noise during soccer games at the Kasch Park soccer fields and the Woodinville fields, which both have flat topography. For both of these facilities, an effort was made to locate sound measurement equipment at setback distances representative of what is planned for the future facility, which ranges from approximately 130' to 170' for the nearest neighboring adjacencies.

For the Woodinville field measurements, noise monitoring equipment was placed at setback distances representative of what we would anticipate for neighboring properties for the future facility. These monitoring locations are shown in Figure 2 on the following page. The east monitor was approximately 135' from the SE edge of the second field, and the other three monitoring locations were 130' (Southeast), 150' (South 2), and 170' (South 1).

Figure 2: Woodinville Fields Measurement Locations

At Kasch Park, monitoring locations were placed along the east side of the fields as shown in Figure 3. Given the nature of the Kasch Park site, setback distances of 130' to 170' were not achieved for monitoring equipment due to the property boundaries to the west and the steep elevation drop-off east of the fields. Instead, monitors were located at 30' to 40' from the east edge of playing fields, ensuring that the meters had a clear line of site to activity on the field. Because these monitoring locations were closer than anticipated setback distances for Wellington Hills fields, measured activity represents a levels that are somewhat louder than would be anticipated at neighboring properties, especially when events on the field were in close proximity to the noise monitors.

Figure 3: Kasch Park Measurement Locations

Wellington Hills Site Measurements

Some of the major noise sources identified around at this site included local traffic along Wellington Heights Road, aircraft flyovers, ambient traffic from SR 522 and Highway 9 and elsewhere, occasional yard maintenance, animals (dogs and birds), and golfers talking, cheering, and hitting golf balls. Given their proximity to Wellington Heights Road, the east and west monitors experienced the highest daily sound levels. The northeast and southeast

monitoring locations were at a farther setback distance from this main roadway and therefore in general experienced lower average levels. These two quieter locations however, were exposed to louder hourly average levels when what we identified as yard maintenance was taking place over an extended period of time, driving the hourly Leq up. This information is summarized in Figure 4, which also includes an Ldn for each day where 24 hours of data was gathered.

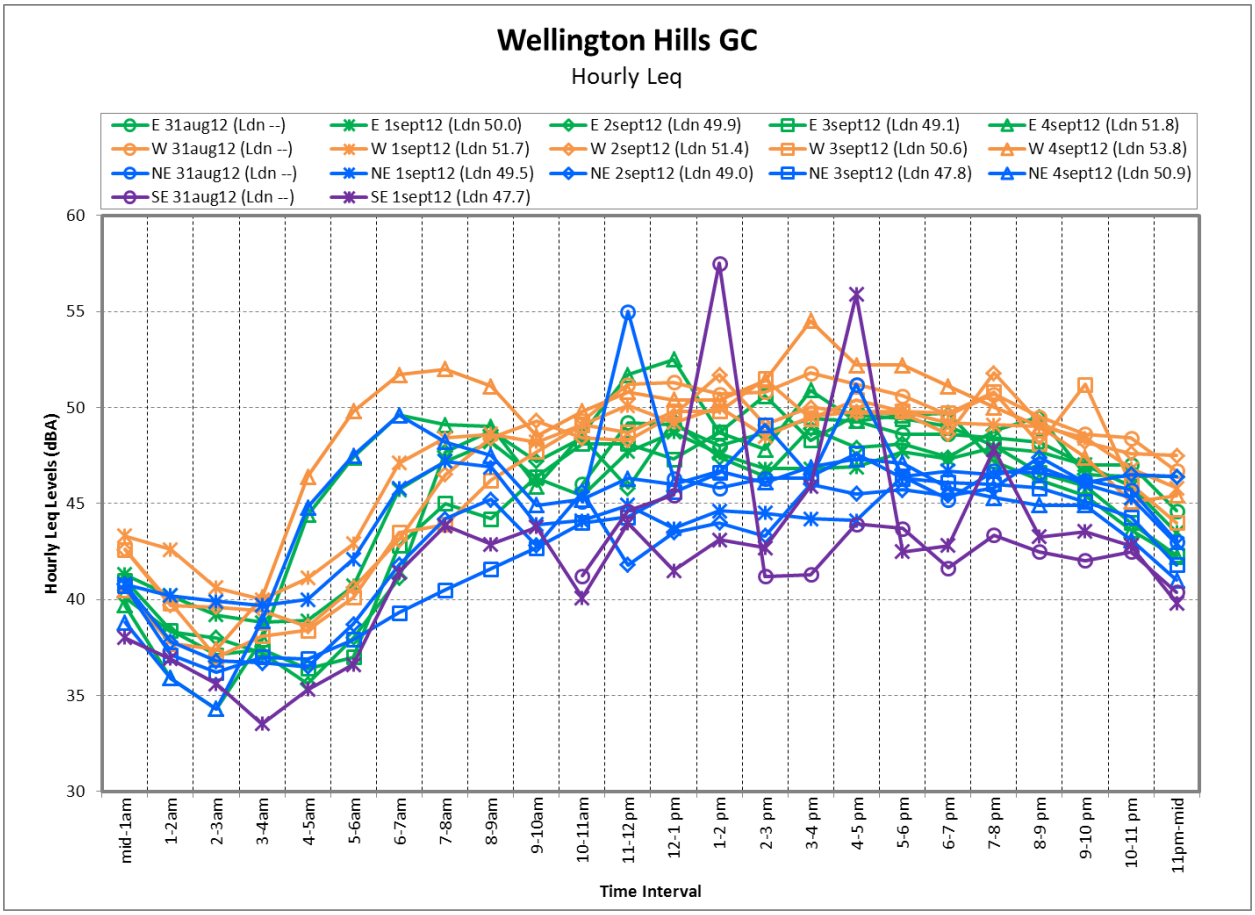

Figure 4: Hourly Leq Levels at Wellington Hills GC

In addition to the hourly averages gathered at these four monitoring locations, higher resolution acoustical data was gathered at the Southeast monitoring location to better understand the existing sound environment nearest to residential properties in the vicinity of where the future fields are planned. Figure 5 shows this more detailed information along with labels of specific source contributions when identifiable[4]. The location of this southeast monitor was placed to be a similar distance as the nearest neighboring properties from the ninth hole tee box - one of the primary noise source locations for this particular area.

[4] Sample recordings were collected for a short window of time to aid in source identification for these loudest type events.

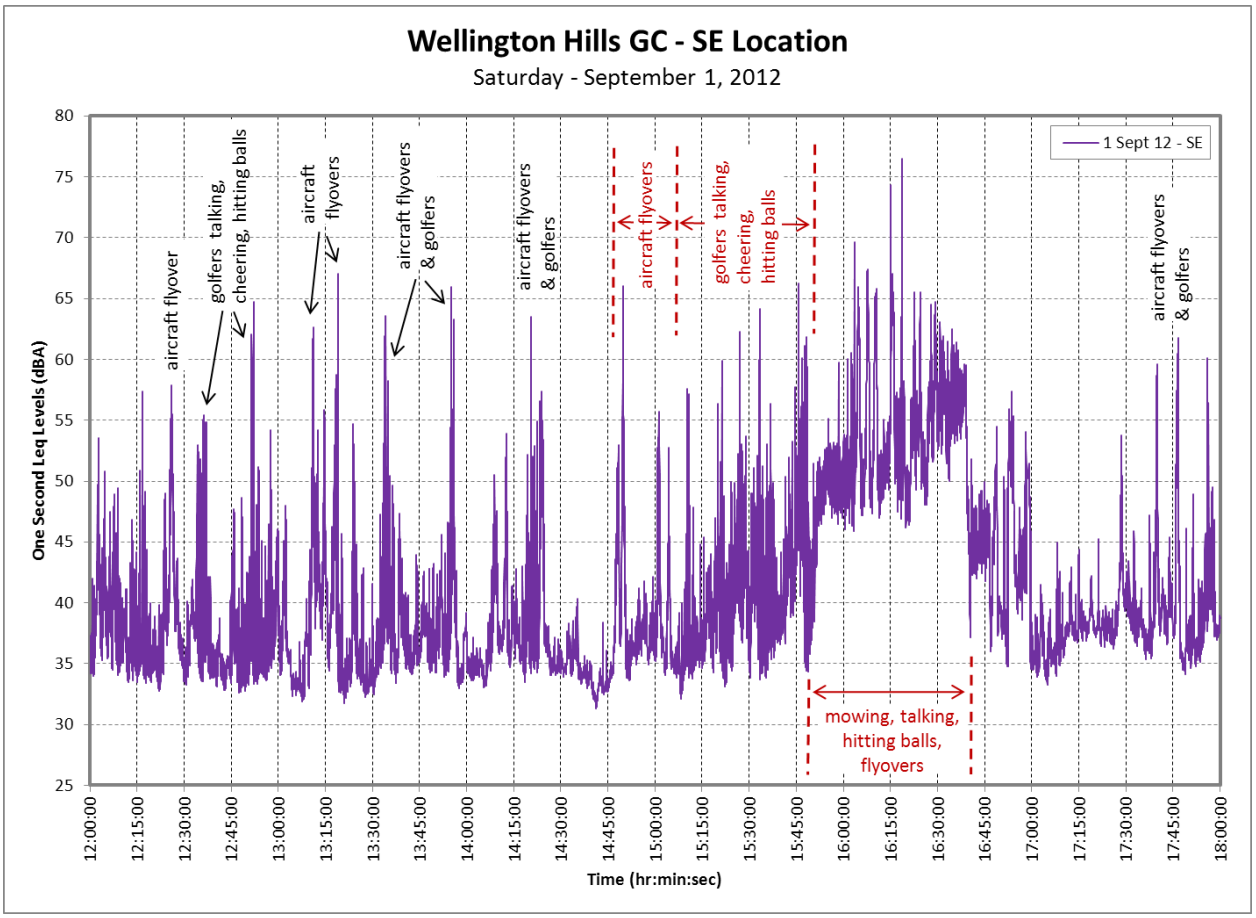

Figure 5 - High Resolution Sound Data Sampled from Noon to 6 pm on Saturday September 1st.

As shown on Figure 5, many of these louder single events were due to golfers talking & cheering, as well as hitting golf balls. Other notable noise sources were aircraft flyovers and a period of approximately 1 hour of during which mowing noise associated with regular golf course maintenance controlled the ambient sound environment. Note that due to limited run time capabilities for this southeast monitor, only approximately two days of data were captured for this location. Similar higher resolution data graphs are included in Appendix C for this location.

Table 1 - Wellington Hills Ambient Noise Measurements at SE Location

	Limits		SE Location - Aug 31st (Fri)					SE Location - Sept 1st (Sat)				
	Day	*Night*	1-2pm	3-4pm	4-5pm	6-7pm	9-10pm	1-2pm	3-4pm	4-5pm	6-7pm	9-10pm
L_{max}	*70*	*60*	**71.9**	52.5	64.8	61.3	51.4	67.0	66.2	**76.5**	63.6	56.9
$L_{2.5}$	*65-70*	*55-60*	66.5	46.9	50.6	47.7	45.6	50.4	52.5	64.2	47.1	48.4
$L_{8.3}$	*60-65*	*50-55*	63.9	44.3	46.4	43.8	44.3	45.3	50.5	60.4	44.6	45.5
L_{25}	*55-60*	*45-50*	54.6	41.6	42.5	40.9	42.7	39.8	45.9	55.4	42.6	43.8
L_{90}	*<55*	*<45*	37.9	37.9	36.9	37.2	39.5	33.3	35.1	42.1	38.4	40.4

Table 1 is a statistical summary of noise levels measured at the SE monitoring location based on the high resolution 1 sec Leq data. The code required levels are also included in this table as a reference. Based on measured levels at this location, noise levels are above the 70 dBA

maximum at this monitoring location during lawn maintenance which occurred both on Friday Aug 31, between 1-2pm and Saturday Sept 1 between 4-5 pm. In the absence of yard maintenance, noise levels were below daytime and nighttime limits.

Measurements at Woodinville Fields
Four children's soccer games were being played for the first approximately 15 minutes of monitoring at the Woodinville Fields. The sound monitoring stations were placed at setback distances as noted above and illustrated in Figure 2 and were located in the parking lot servicing these playfields. For each of these noise monitors, detailed sound information was gathered every second. An acoustician was onsite for the duration of these measurements making observations.

The Southeast monitor also recorded brief data samples for loudest event type to aid in source identification. Figure 6 below shows detailed information about noise events observed until about 16:25 when sports field activities ended and players and spectators left the fields. Similar graphs are presented in Appendix C for the other 3 locations.

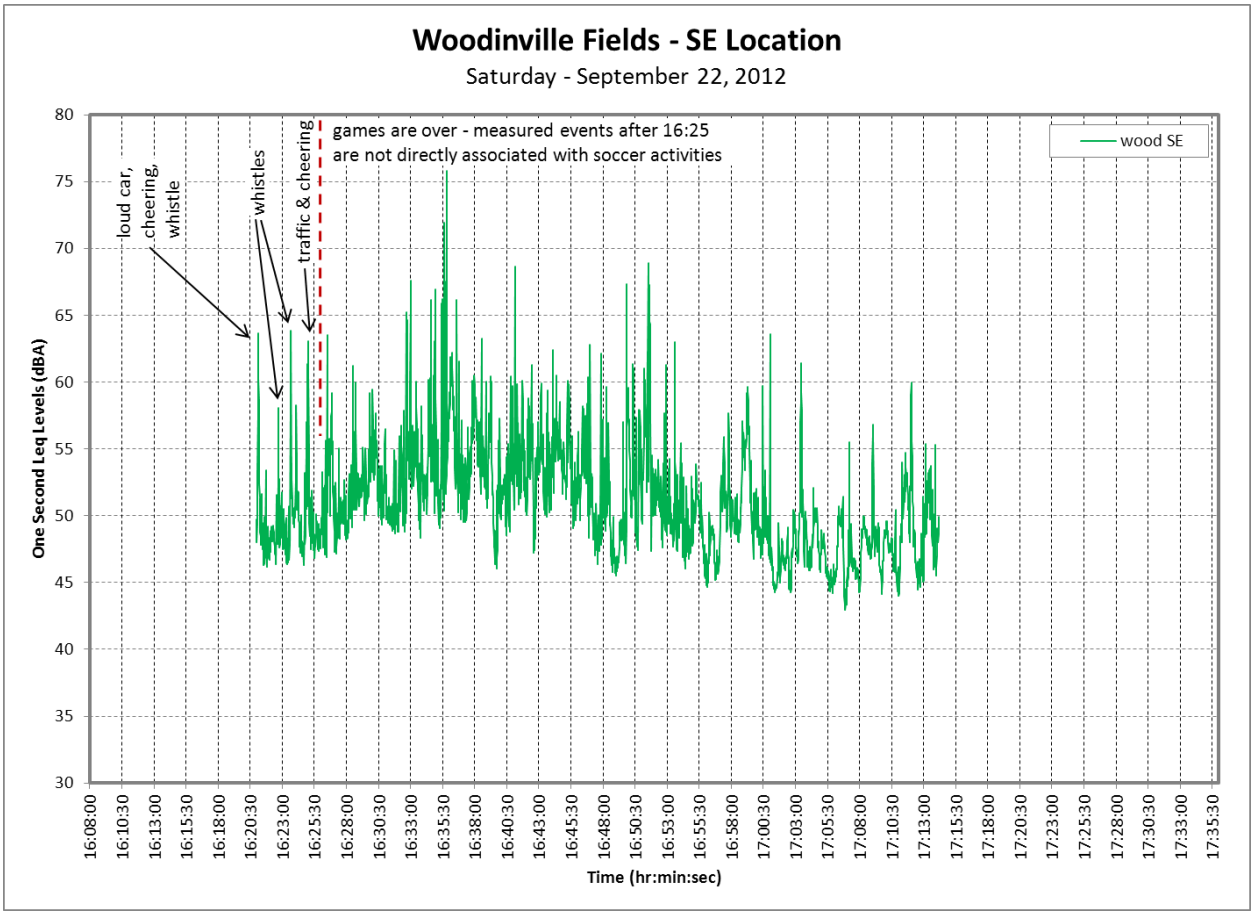

Figure 6 – Woodinville Fields Noise Monitoring at SE Location.

We observed that major noise sources at this site were due to traffic along nearby roadways as well as cars occasionally entering and exiting the parking lot. The noise level from referee whistles from sports field activities and was seen to be between 60-65 dBA. This level was only

over 65 dBA when another source (such as traffic or aircraft flyover) combined with the whistle blast events occurred simultaneously. These whistle type events were observed every 2-3 minutes on average, and were of no more than a few seconds duration.

The other main noise associated with sports field activity was human activity from clapping, talking and cheering. These events were more prevalent, and although not continuous, were audible at least every ten seconds. We observed voice levels to be no more than 50-55 dBA when isolated from other ambient activity. The quietest background noise observed was attributed to distant automobile and aircraft traffic ranging from 45- 50 dBA for this site.

Table 2 below presents statistical levels measured during noise events. If these were the levels encountered at the neighboring property lines for the future Wellington Hills facility, noise levels would easily meet the daytime limits at all locations. These levels would be in exceedance of all nighttime ordinance requirements however.

Table 2 – Woodinville Fields - Statistical Noise Levels Measured During Soccer Games

Noise Metrics	*Limits*		Woodinville Fields			
	Day	*Night*	**E**	**SE**	**S1**	**S2**
L_{max}	*70*	*60*	63.0	63.8	65.6	68.1
$L_{2.5}$ (up to 1.5 min/hour)	*65-70*	*55-60*	58.5	59.1	61.4	62.4
$L_{8.3}$ (up to 5 min/hour)	*60-65*	*50-55*	56.3	54.6	55.5	57.6
L_{25} (up to 15min/hour)	*55-60*	*45-50*	53.7	50.7	51.8	53.2
L_{90} (background)	*<55*	*<45*	49.7	47.2	48.0	49.1

Notes: night noise limits (between 10pm and 7am) would be reduced 5 dB for whistle blasts

Measurements at Kasch Park

During measurements gathered at the Kasch Park facility there were three co-ed adult league soccer games were being played simultaneously. As shown in Figure 3, sound monitoring stations were placed at setback distances closer than those anticipated for neighboring properties at the future Wellington Hills facility. As a result, monitored levels, especially the loudest observed events, are higher than levels anticipated at neighboring properties. For each of these noise monitors, detailed sound information was gathered every second for each of these meters. An acoustician was onsite for the duration of these measurements. The East monitor also recorded brief data samples for loudest event type to aid in source identification. Figure 7 on the following page shows detailed information about these noise observations. Similar graphs for the other locations are included in the Appendix C.

Major noise sources not associated with soccer games included traffic from nearby roadways, especially along Boeing Freeway (Hwy 526) and aircraft flyover. Unidentified noise possibly associated with Boeing operations was also audible from time to time. As was observed at the Woodinville fields, dominant noise from the soccer events included referee whistles (most dominant) and human activity (cheering, talking, and clapping). Unlike what we observed at the children's soccer games, the principle source of human noise was from the players themselves, and to a much lesser extent, the coaches and spectators. Players would call to other teammates and shout and cheer throughout the games.

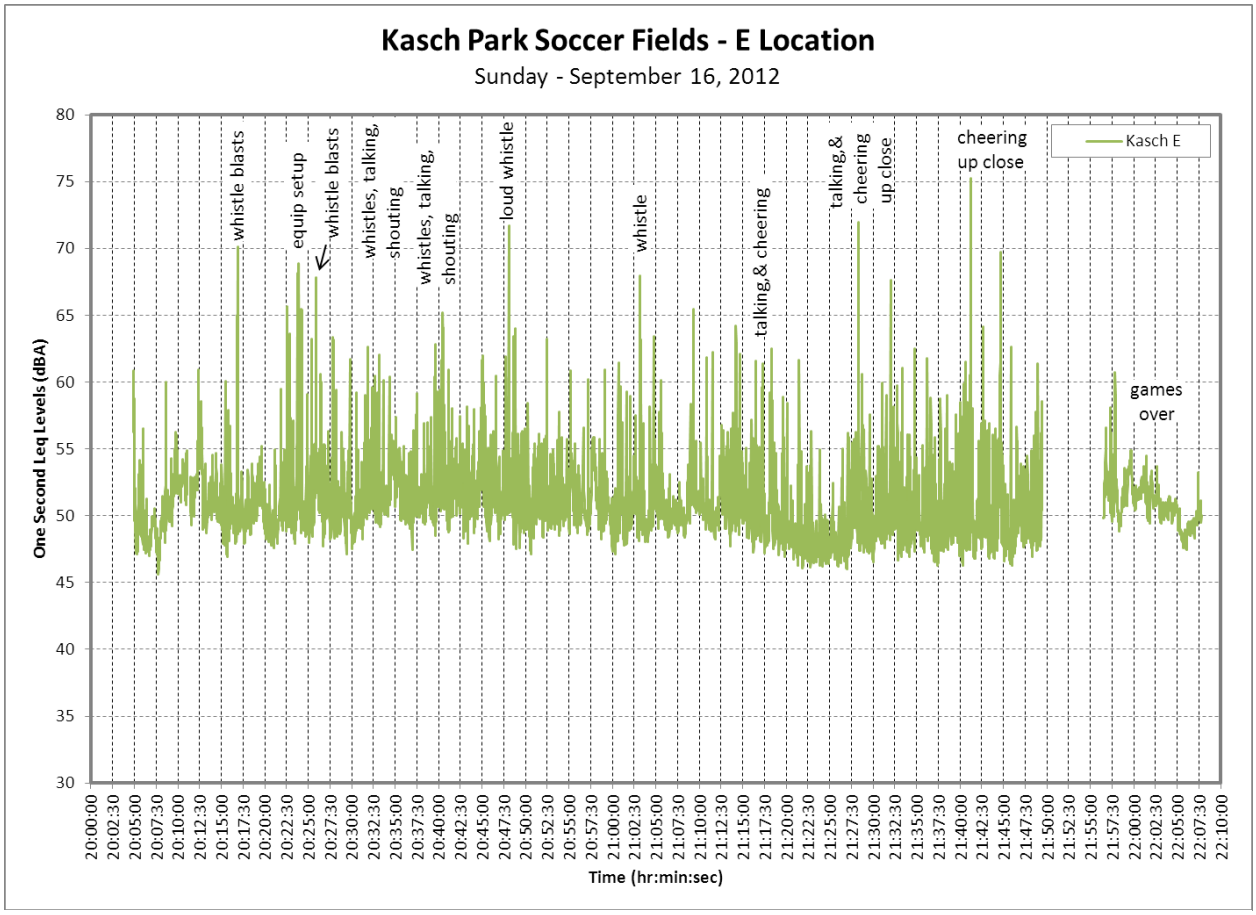

Figure 7 – Kasch Park Measurements at East Monitoring Location

Noise levels from referee whistles were seen to range from 60-75 dBA. As noted above, the noise monitors were significantly closer than we would expect for the nearest neighboring properties by at least by 100'. As a result, we would anticipate that these noise levels are at least 7-10 dB higher than what we would predict at the Wellington Hills facility when correcting for distance and topography. The difference in measured whistle levels observed at Woodinville Fields support this as well.

Human voices were also louder than what was observed at Woodinville fields. Based on our measurements when talking & yelling players were as close as 25'-50' to the monitors, levels were between 65-70 dBA. A vast majority of vocal activity on the site was less than 60 dBA however. Based on our observations, we would expect that adult league games may have a more significant human voice contribution. In accounting for the added setback distances similar to what is anticipated for neighboring property boundaries at the future Wellington Hills facility, we would expect these voice levels to be up to 55-60 dBA, or approximately 5 dB more than kids league games given the main source of noise is players moving around the field rather than coaches and spectators generally staying in one place.

Table 3 –Kasch Park - Statistical Noise Levels Measured During Soccer Games

Noise Metrics	*Limits*		First Hour			Second Hour		
	Day	*Night*	SE	E	NE	SE	E	NE
L_{max}	*70*	*60*	**73**	**71.7**	**70.8**	68.8	**75.3**	67.8
$L_{2.5}$ (up to 1.5 min/hour)	*65-70*	*55-60*	59.2	58	58.5	58.2	57.6	57.4
$L_{8.3}$ (up to 5 min/hour)	*60-65*	*50-55*	56.1	54.8	55.2	55	54	53.9
L_{25} (up to 15min/hour)	*55-60*	*45-50*	53.7	52.4	52.7	52.7	51.4	51.4
L_{90} (background)	*<55*	*<45*	50.3	47.4	48.8	49.5	47.8	48.6

Table 3 presents statistical levels measured during soccer activity. If these were the levels encountered at the neighboring property lines for the future Wellington Hills facility, noise levels would easily meet the daytime limits at all locations, with an exception of the maximum events due to whistle blasts. When taking into account neighboring property line distances and planned topography for the Wellington Hills facility however, actual whistle levels are expected to be at least 7 dB below these maximum values, bringing L_{max} levels into compliance as well. Other levels were easily within compliance of noise ordinance, even without accounting for any additional distance or topography. If these levels were encountered at night however, we would anticipate that facility levels would exceed noise ordinance requirements at the nearest neighboring properties.

Acoustical Impacts

Based on our findings, the future Wellington Hill facility is expected to be within noise ordinance compliance for operations during daytime hours. If anticipated activities extend beyond 10 pm however, noise at adjacent properties is expected to be well above noise ordinance requirements.

Berming has been included into the facility design to enhance the acoustical separation between playfield areas and neighboring adjacencies. The planned topography for the facility in general will provide a line of site buffer from the playfields for activity and players closest to adjacent properties. When berming provides a line of site obstruction from a noise source, a reduction in 8 dB or more is typically observed.

From our ambient measurements at the southeast monitoring location we observe that residential property locations that abut to future playfield areas on the south will have ambient background levels lower than the Kasch Park and Woodinville fields where soccer event noise monitoring occurred. Although it is anticipated that noise from playfield activities will meet daytime noise code at all neighboring properties, this noise is expected to increase the ambient outdoor noise environment for the nearest adjacent properties to the south and east. For these specific areas, when other noise sources such as airplane flyovers, local traffic, etc. are limited or absent, we anticipate that human voices during games would have an easily audible presence in outdoor areas of these nearest adjacencies, even when taking into account the reduction in noise due to berming.

For properties immediately south of the playfields along the King and Snohomish county line, voices from playfield events may be similar in amplitude and character to what is currently experience due to golfer activity (cheering, talking, etc.) although voices from playfield events may be heard more often.

For properties to the east of the future playfields, noise from golfers would be much further removed from these locations, so the introduction of cheering and human voices is expected to be fairly new to these areas.

Properties to the north of the playfields across 240th St SE will see considerably less of an acoustical impact from associated activities. Although noise from cheering and whistles may still be audible from time to time, the increased distance and prevalence of unrelated noise sources (mainly neighborhood traffic along 240th St SE and/or 75th Ave SE) will reduce the perceptibility of noise from playfield activity. For properties farther north of 240th St SE even less of an impact will be realized due to increasing distance from playfield areas and in some areas due to changes in topography.

Appendix A - Measurement Setup

All acoustical data presented in this report is A-weighted to account for the human ear's perception of noise, unless stated otherwise. For each of the observation sites, one of the meters (B&K 2250) was set to take capture a sample recording for the loudest levels to help identify loudest events. Observation notes were taken by an onsite acoustician for the duration of monitoring for both the Kasch Park and Woodinville Fields locations. Regardless of measurement site all of the sound level meters were time synchronized to ensure they were measuring the same instant in time.

For each of the three measurement sites, while present we observed there was no wind activity (0 mph) at the level of noise monitoring equipment each measurement location.

All of the equipment used in the measurements was within its current laboratory calibration and was field calibrated prior to the measurement with a handheld calibrator. The equipment used for this project is shown in Table A1 below.

Table A1: Equipment List

Site	Location	SLM	Serial # (SLM/Mic)
Wellington Hills GC	East	LD 820	1633/104678
	West	LD 820	1646/105267
	Northeast	LD 820	1277/2614
	Southeast	B&K 2250	2575779/2281889
Woodinville Fields	East	LD 820	1633/104678
	South 1	LD 820	1646/105267
	South 2	LD 820	1277/2614
	Southeast	B&K 2250	2575779/2281889
Kasch Park	Northeast	LD 820	1646/105267
	Southeast	LD 820	1277/2614
	East	B&K 2250	2575779/2281889

Table Notes:

- SLM - Sound Level Meter
- LD - Larson Davis
- B&K - Brüel & Kjær

Appendix B – Noise Descriptors & Definition of Terms

1/3 Octave Band Spectrum
The 1/3 octave band spectrum represents the tonal components that makes up the overall noise level observed. Where the L_{eq} is a measure of the equivalent energy and does not provide any information about the tonal content of the sound, the 1/3 octave band spectrum shows the relative amplitude of the tonal components of the sound observed. The spectrum of a sound can be used to identify a source by its shape (relative amplitude of the tonal components)

Ambient Noise
All-encompassing sound at a given location, usually a composition of sounds from a combination of sources both near and far.[5]

A-weighting (dBA)
The human ear responds differently to sounds at different frequencies (pitch). This is demonstrated by the fact that we hear higher pitched sounds easier than lower ones of the same magnitude. To compensate for the different "loudness" as perceived by humans at different pitches, a standard weighting curve is applied to measured decibel (dB) levels. This weighting curve represents the sensitivity of the human ear, and is labeled "A" weighting. Unit symbol is dBA.

Contributions of a Noise Event in Terms of Measured Levels
A given noise source might be audible in a sound environment, but may not perceptibly raise the overall sound level. For example, a noise source that is 10 dBA below baseline levels may still be audible even though there is no practical measureable increase in sound level.

Noise events that are 5 dBA quieter than baseline levels may not seem any louder but will increase the measured level by 1 dBA. When a noise event is the same amplitude as the baseline levels, it will increase the measured sound level by 3 dBA.

When a noise event is 5 dBA or more above baseline levels, it begins to control the measured level. For example a baseline sound level of 45 dBA and a noise event of 50 dBA will be measured at 51 dBA.

When a noise event is 10 dBA or more above baseline levels, the noise measured begins to be dominated by the event itself. For example, a baseline level of 45 dBA and a noise event of 55 dBA will be measured at 55 dBA.

Day-Night Average Sound Level (Ldn)
Twenty-four hour average sound level for a given day, after addition of 10 dB to levels from midnight to 0700 hours and from 2200 hours (10pm) to midnight. [5] This values is calculated from A-weighted hourly Leq values.

Decibel (dB)
Unit of level when the base of the logarithm is the tenth root of ten, and the quantities concerned are proportional to power. Unit symbol is dB.[5]

Equivalent Sound Level (L_{eq})

[5] ANSI S1.1-1994 - Acoustical Terminology

The L_{eq} noise descriptor is the Equivalent Sound Level of a constant sound which has the same acoustical energy as the time-varying sound over a designated period of time. This is a single value sound level that represents the *energy average* of all the noise levels sampled over the designated interval. A source that produces a constant sound level of 60 dBA for a ten minutes, and then produces a constant sound level of 50 dBA for ten minutes would produce a 20 minute L_{eq} of 47 dBA (the logarithmic average of 40 and 50). Note that the level in the L_{eq} calculation is closer to the higher sound level because the higher level has more *energy*. Units of dBA unless noted otherwise.

Inaudible
A noise that cannot be heard.

Noise Source Addition
Because the decibel scale is logarithmic, individual dB ratings for different noise sources cannot be added or subtracted directly to give the dB rating of the combination of these sources. For example, two noise sources producing equal dB ratings at a given location will produce a composite noise that is 3 dB greater than the individual levels.

Perceived Loudness
Loudness is the subjective response to the amplitude of sound. It is judgment of intensity of sound by a human being. It is not linearly related to sound levels (dB or dBA). The general guidelines for subjective response to changes in loudness as related to sound pressure level are shown in Table A1 below.

Table B1: Subjective Response to Changes in Sound Level

Difference in Sound Level	Change in apparent loudness[6]
1 dBA	Unnoticeable (except of tones)
3 dBA	Just noticeable
5 dBA	Clearly noticeable
10 dBA	About twice (or half) as loud
20 dBA	About 4 times (or quarter) as loud

Pure Tone Component
Sound having the following qualities: a one-third octave band sound pressure level in the band with the tone that exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies of 500 Hz and above, by 8 dB for center frequencies between 160 and 400 Hz, and by 15 dB for center frequencies less than or equal to 125 Hz. For example, the sound made by a siren often meets the definition of a "pure tone component".[7]

Time History
The time history (for the purposes of this report) is the L_{eq} level over a 1 second interval. Measuring the L_{eq} over a 1 second interval captures the variation in amplitude of the noise which can be used for high resolution of noise levels.

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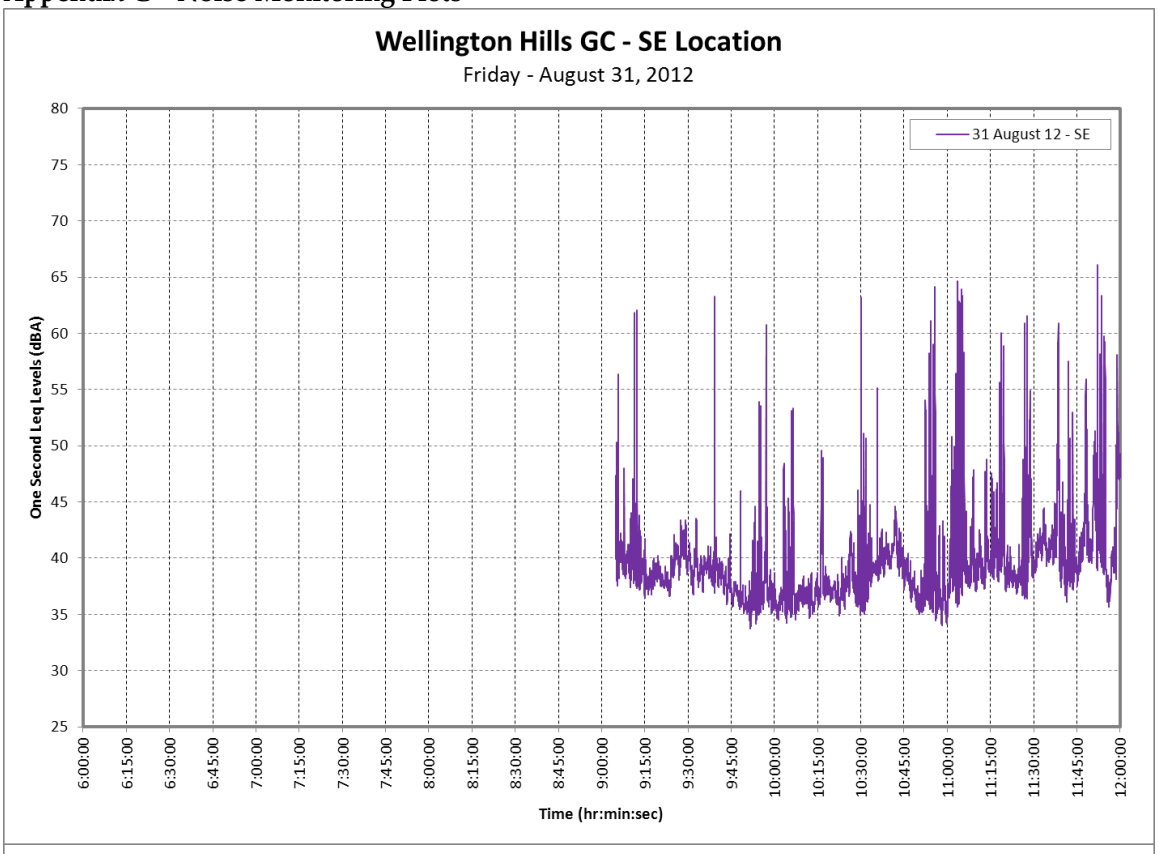
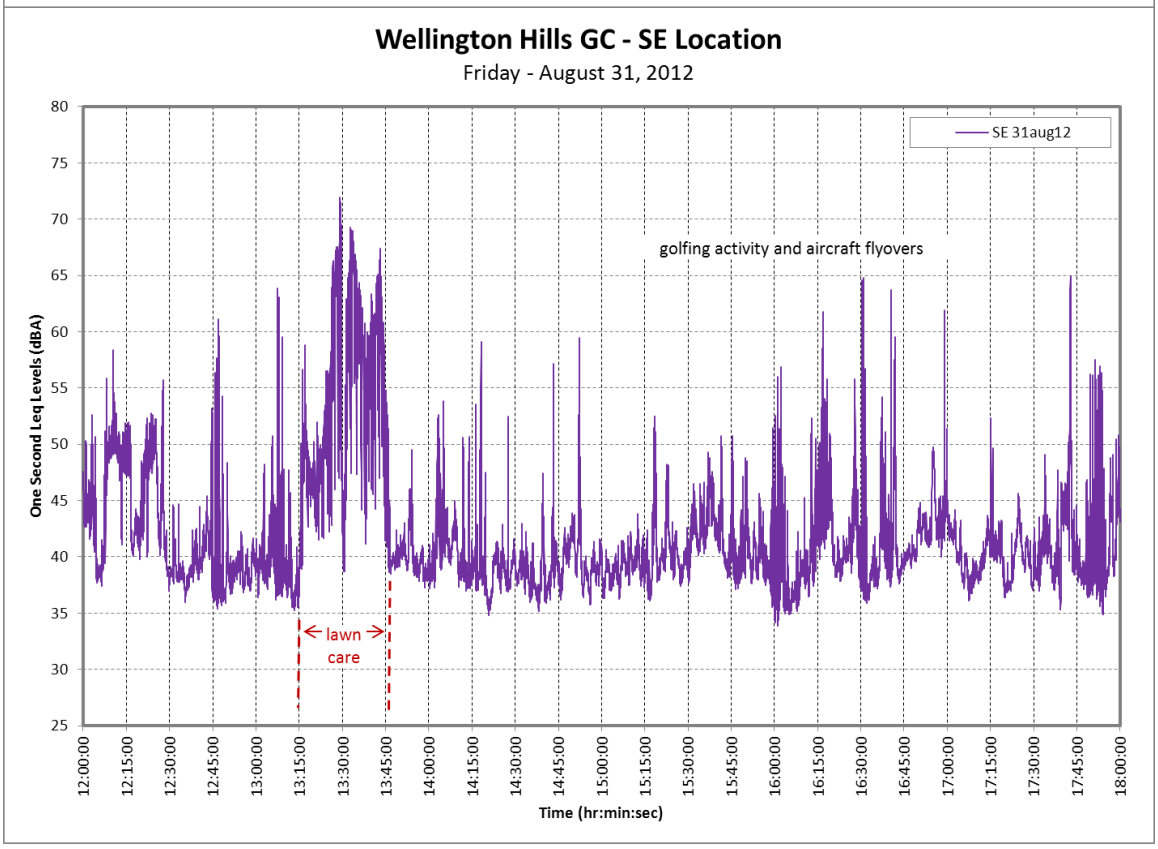
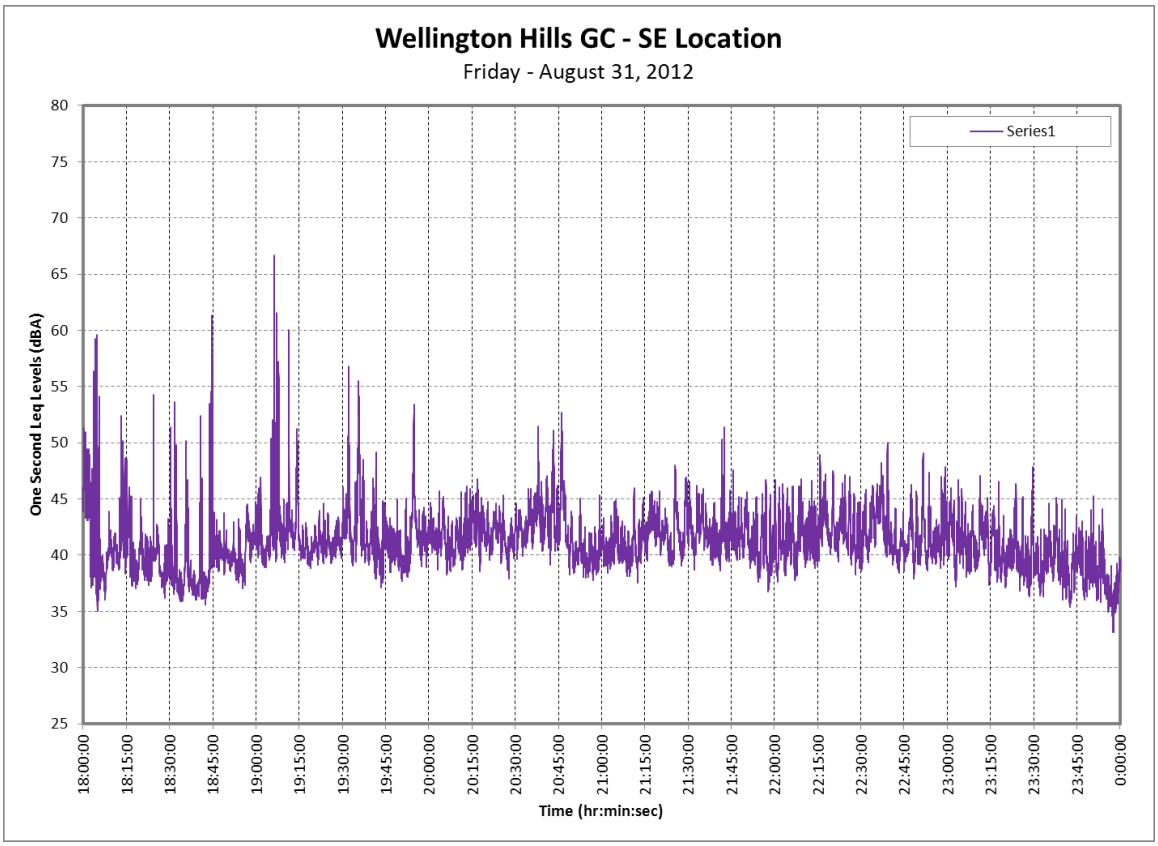
[6] (O.L. Angevine, "Individual Differences in the Annoyance of Noise" *Sound and Vibration*, November 1975
[7] Snohomish County Code 10.01.020-27

Appendix C – Noise Monitoring Plots






Wellington Hills GC - SE Location
Friday - August 31, 2012
Series1
One Second Leq Levels (dBA)
80
75
70
65
60
55
50
45
40
35
30
25
18:00:00
18:15:00
18:30:00
18:45:00
19:00:00
19:15:00
19:30:00
19:45:00
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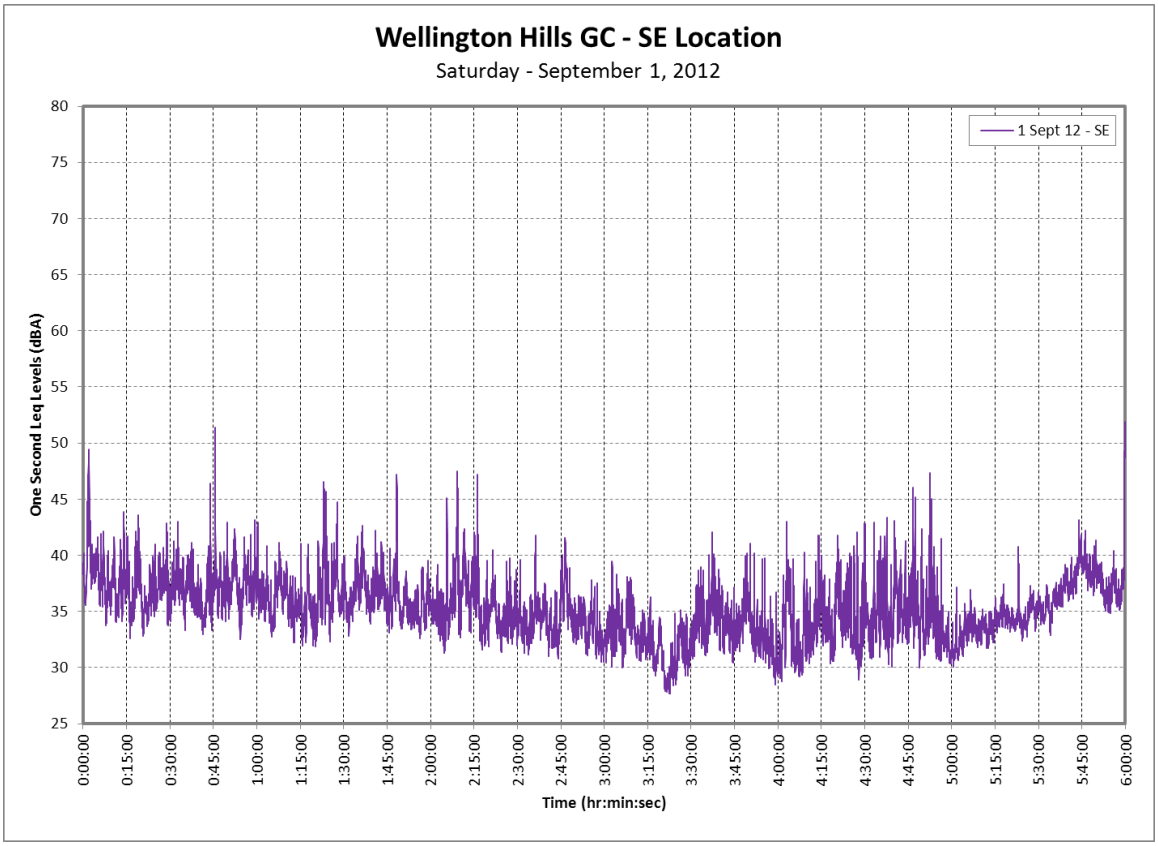
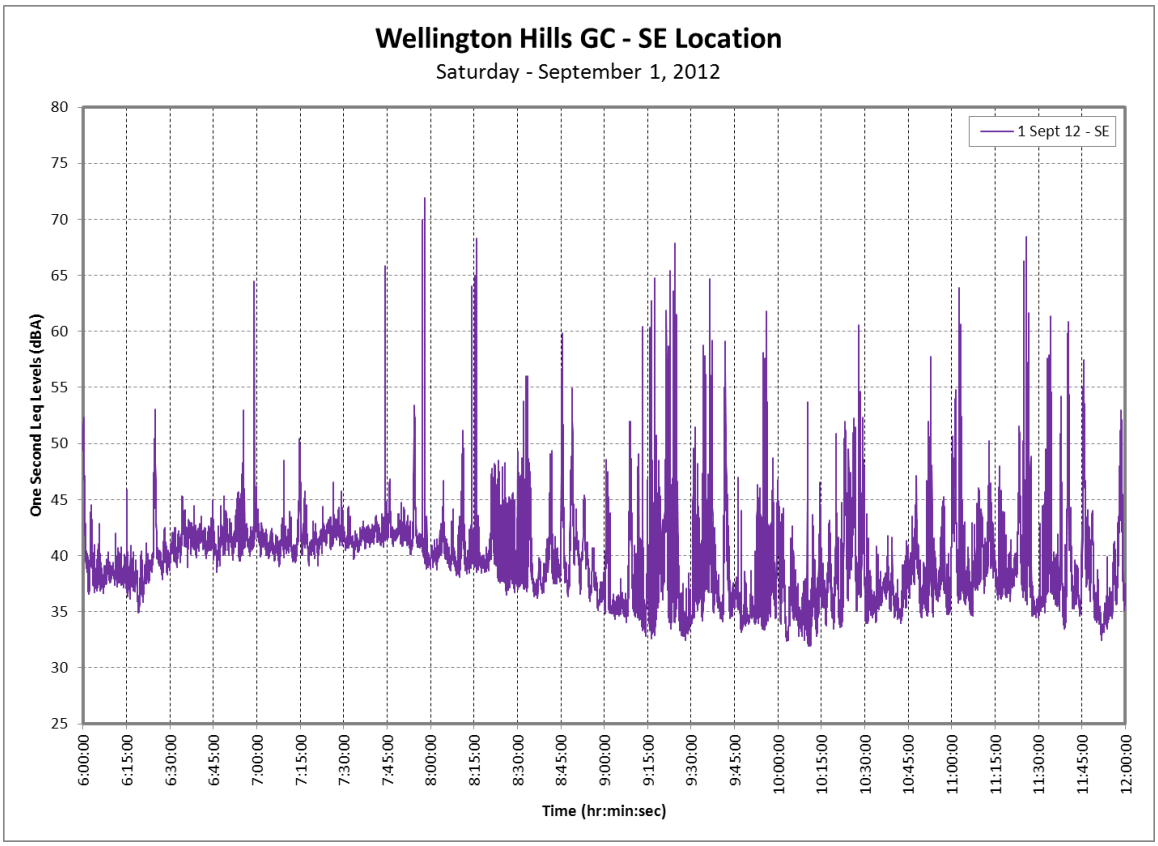
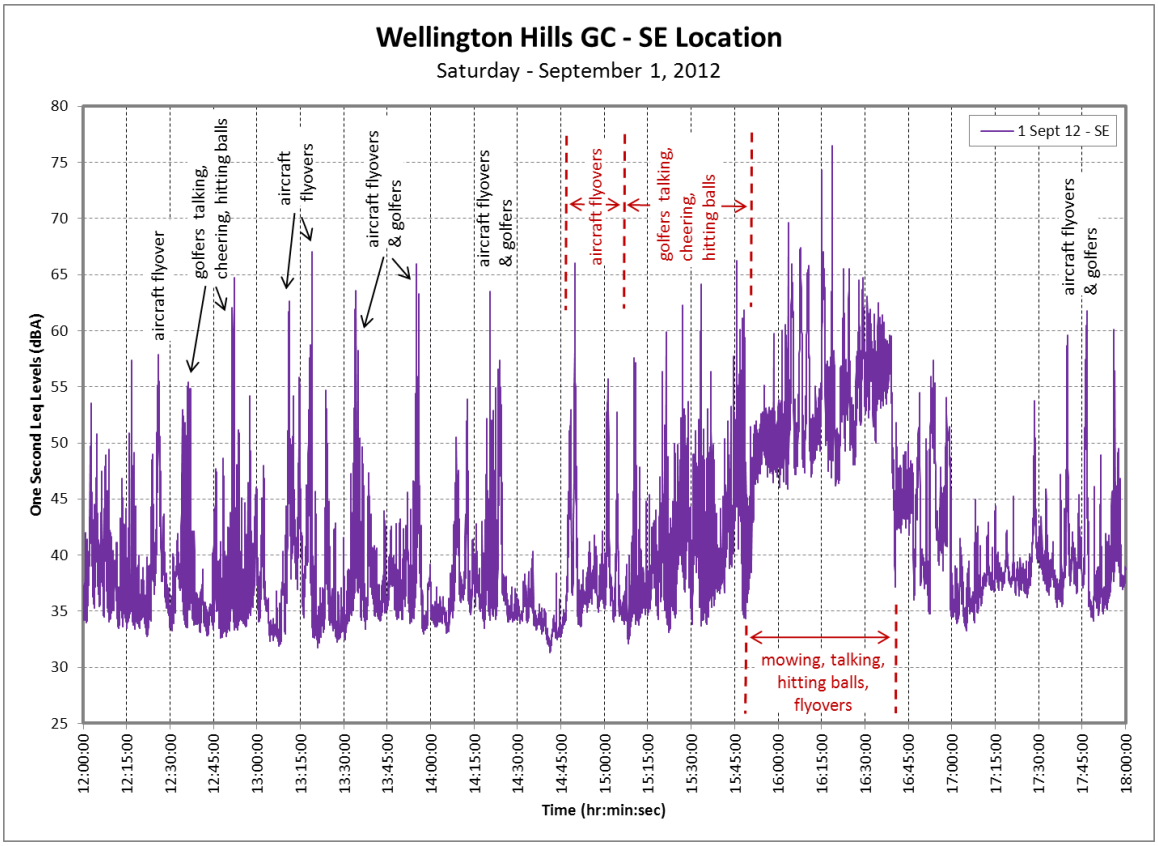
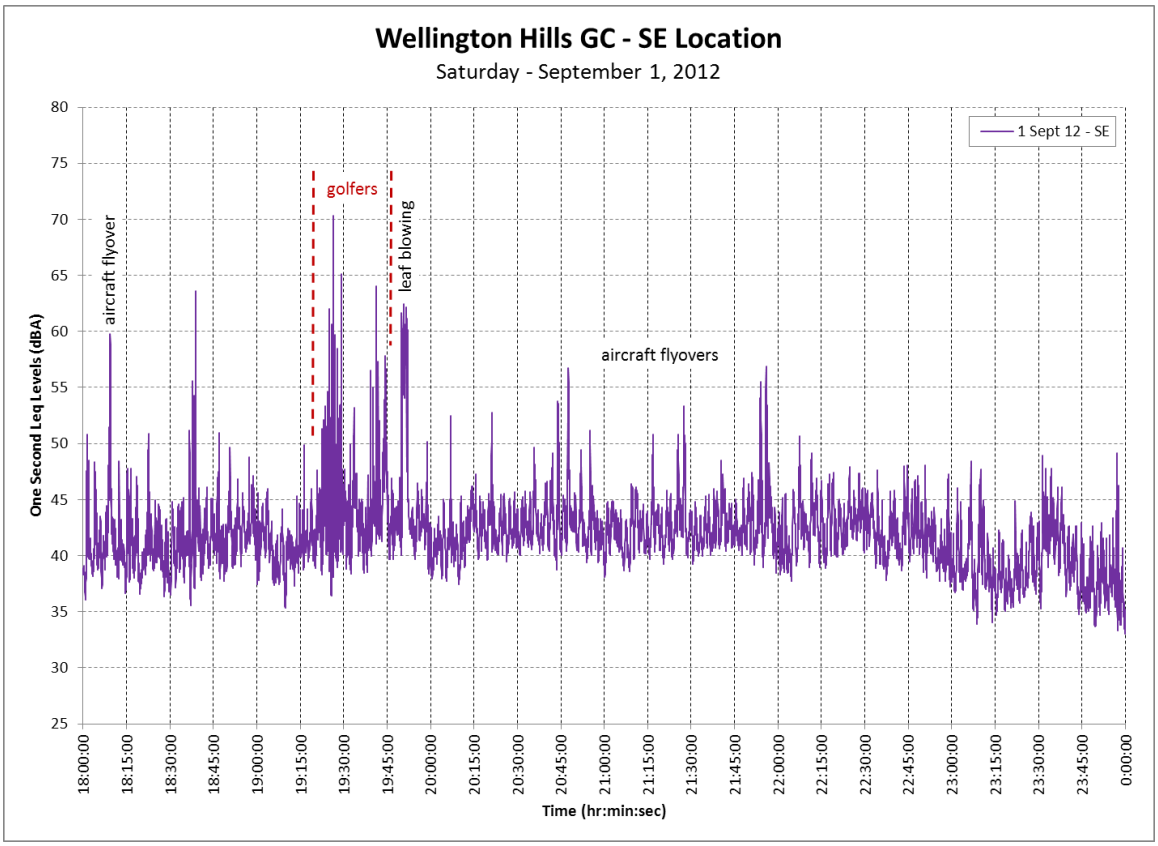
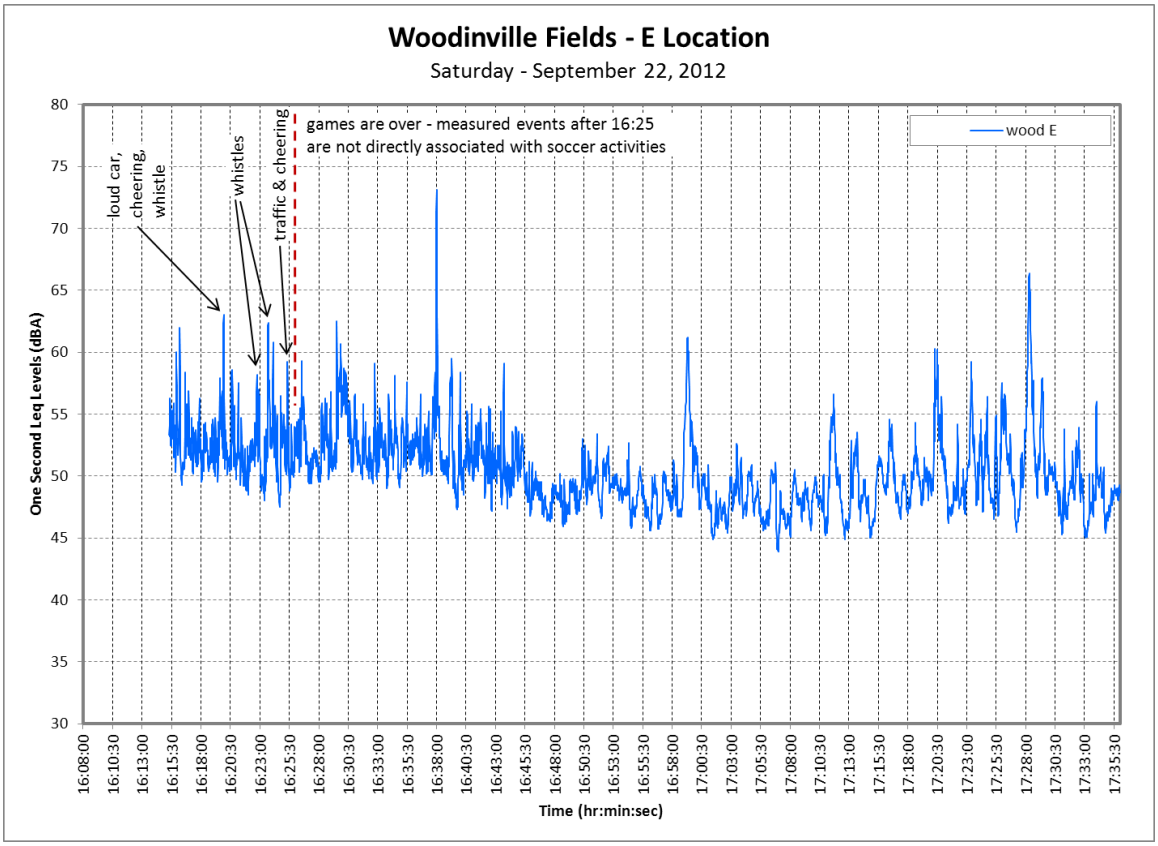
0:00:00
Time (hr:min:sec)

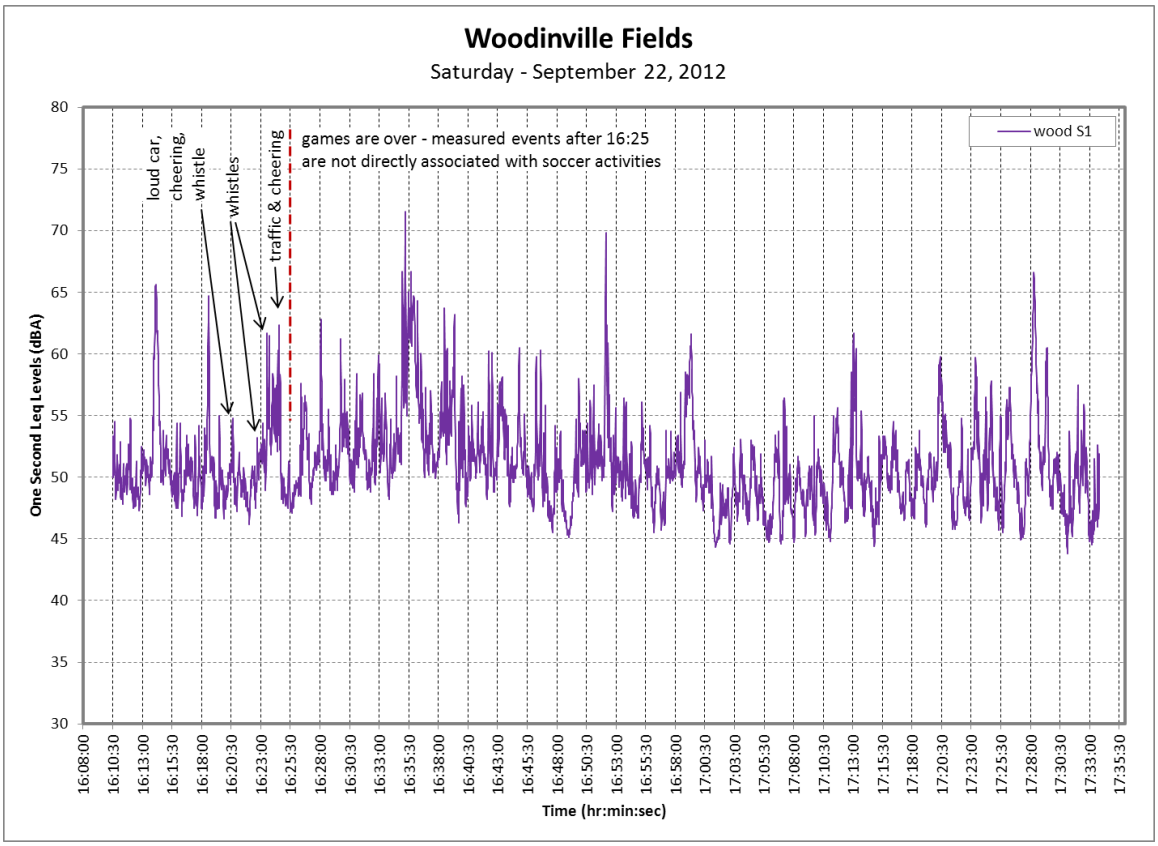

Wellington Hills GC - SE Location
Saturday - September 1, 2012
1 Sept 12 - SE
One Second Leq Levels (dBA)
80
75
70
65
60
55
50
45
40
35
30
25
0:00:00
0:15:00
0:30:00
0:45:00
1:00:00
1:15:00
1:30:00
1:45:00
2:00:00
2:15:00
2:30:00
2:45:00
3:00:00
3:15:00
3:30:00
3:45:00
4:00:00
4:15:00
4:30:00
4:45:00
5:00:00
5:15:00
5:30:00
5:45:00
6:00:00
Time (hr:min:sec)

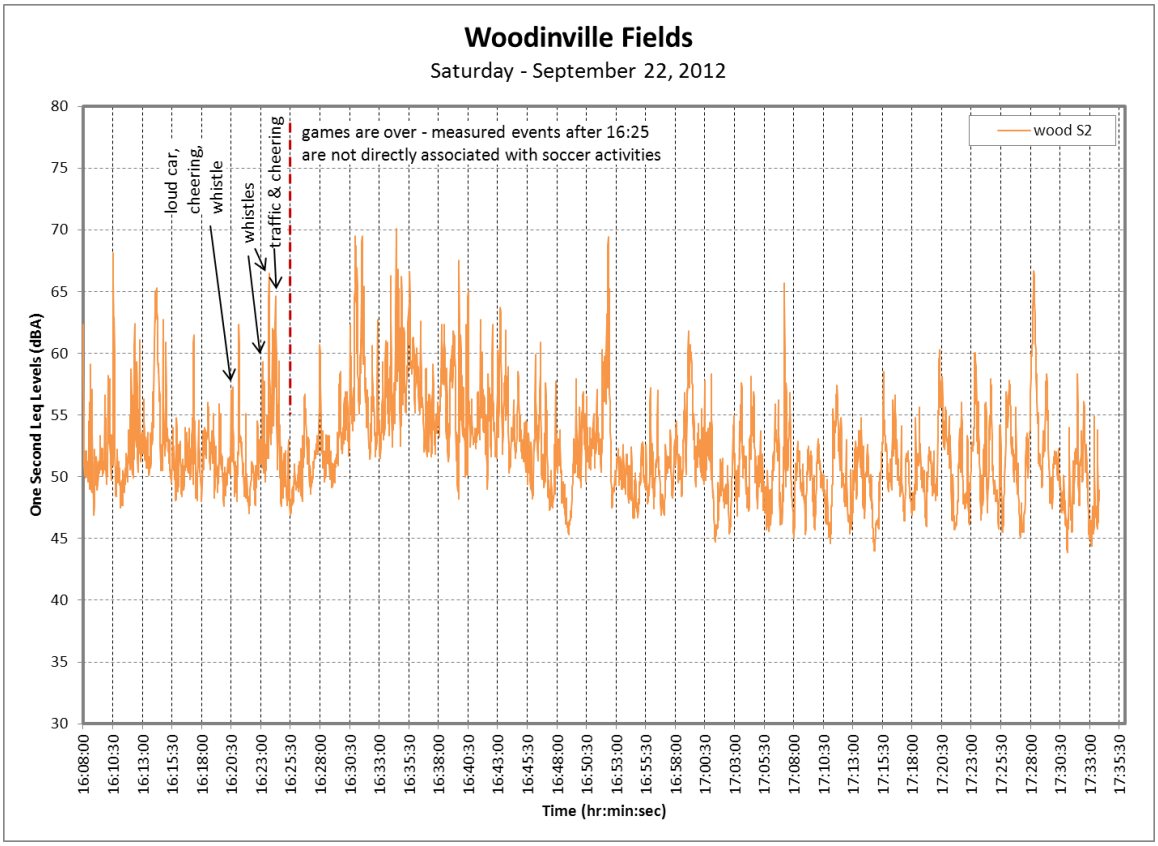

Wellington Hills GC - SE Location
Saturday - September 1, 2012
1 Sept 12 - SE
One Second Leq Levels (dBA)
Time (hr:min:sec)

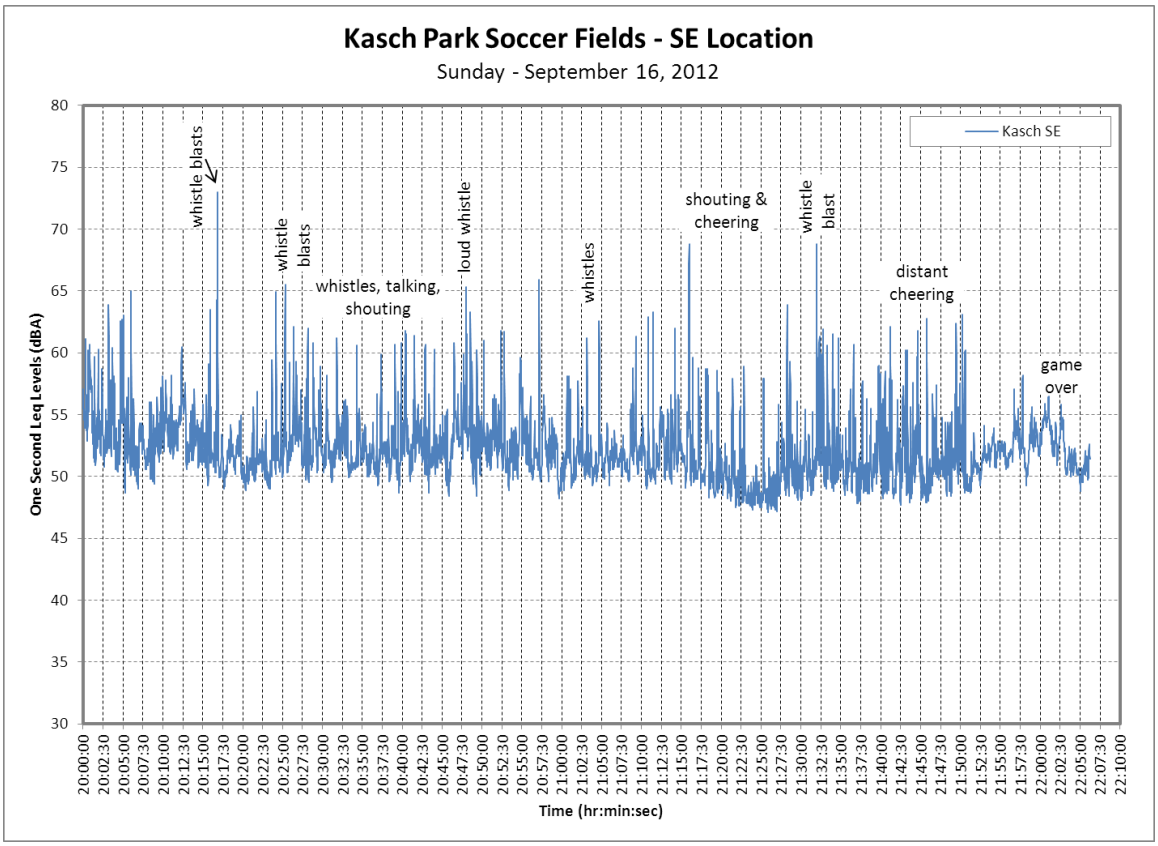

Wellington Hills GC - SE Location
Saturday - September 1, 2012
1 Sept 12 - SE
aircraft flyover
golfers talking, cheering, hitting balls
aircraft flyovers
aircraft flyovers & golfers
aircraft flyovers & golfers
aircraft flyovers
golfers talking, cheering, hitting balls
aircraft flyovers & golfers
mowing, talking, hitting balls, flyovers
One Second Leq Levels (dBA)
Time (hr:min:sec)

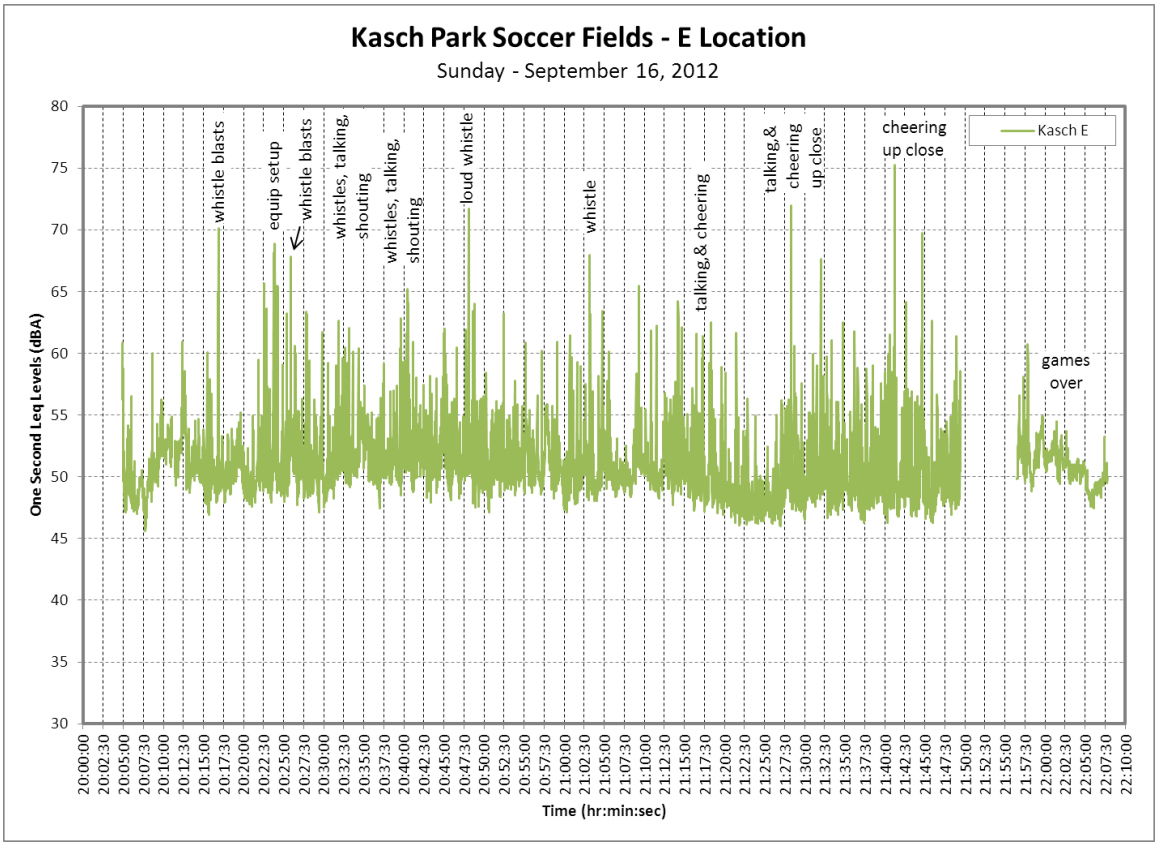

Wellington Hills GC - SE Location
Saturday - September 1, 2012
1 Sept 12 - SE
aircraft flyover
golfers
leaf blowing
aircraft flyovers
One Second Leq Levels (dBA)
Time (hr:min:sec)

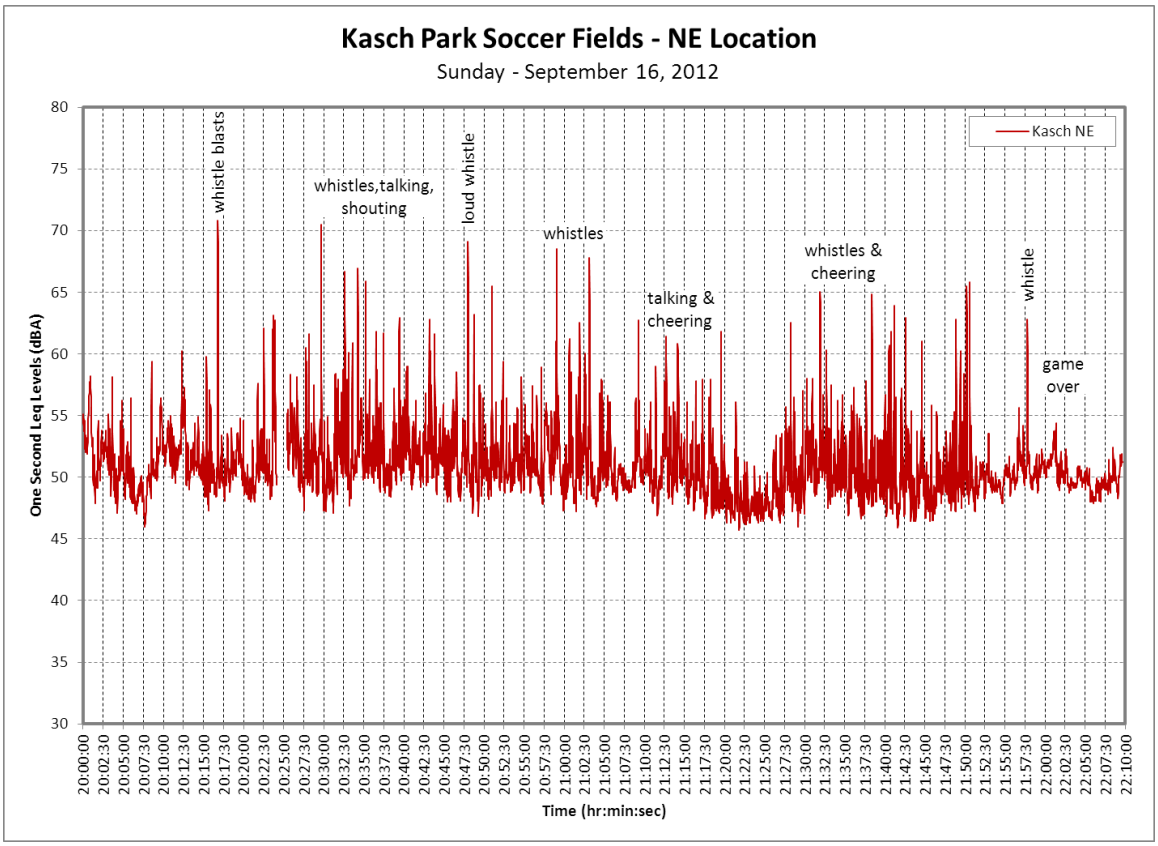

Woodinville Fields - E Location
Saturday - September 22, 2012
wood E
games are over - measured events after 16:25
are not directly associated with soccer activities
loud car, cheering, whistle
whistles
traffic & cheering
One Second Leq Levels (dBA)
Time (hr:min:sec)


Woodinville Fields
Saturday - September 22, 2012
wood S1
loud car, cheering, whistle
whistles
traffic & cheering
games are over - measured events after 16:25
are not directly associated with soccer activities
One Second Leq Levels (dBA)
Time (hr:min:sec)


Woodinville Fields
Saturday - September 22, 2012
wood S2
loud car, cheering, whistle
whistles
traffic & cheering
games are over - measured events after 16:25
are not directly associated with soccer activities
One Second Leq Levels (dBA)
Time (hr:min:sec)


Kasch Park Soccer Fields - SE Location
Sunday - September 16, 2012
Kasch SE
One Second Leq Levels (dBA)
Time (hr:min:sec)
whistle blasts
whistle blasts
whistles, talking, shouting
loud whistle
whistles
shouting & cheering
whistle blast
distant cheering
game over


Kasch Park Soccer Fields - E Location
Sunday - September 16, 2012
Kasch E
One Second Leq Levels (dBA)
Time (hr:min:sec)
whistle blasts
equip setup
whistle blasts
whistles, talking, shouting
whistles, talking, shouting
loud whistle
whistle
talking,& cheering
talking,& cheering
up close
cheering up close
games over


Kasch Park Soccer Fields - NE Location
Sunday - September 16, 2012
Kasch NE
whistle blasts
whistles,talking, shouting
loud whistle
whistles
talking & cheering
whistles & cheering
whistle
game over
One Second Leq Levels (dBA)
Time (hr:min:sec)